

## Ecological Succession

Just as the people living in your neighborhood can come and go, ecological communities change over time. One way a community can change is if external conditions shift. If the weather in a certain geographical area suddenly gets colder, certain populations will be better off and will thrive, while others will shrink and disappear.

However, change in communities is not always caused by external factors: populations can change environments simply by living in them. The success of a particular population in a particular area will change the environment to the advantage of other populations. In fact, the originally successful population often changes the environment to its own detriment. In this way, the populations within a community change over time, often in predictable ways. The change in a community caused by the effects of the populations within it is called ecological succession.

The first population to move into a geographical area is referred to as a **pioneer organism**. If this pioneer population is successful in its new location, it will change the environment in such a way that new populations can move in. As populations are replaced, changing plant forms bring with them different types of animals. Typically, as a community moves through the stages of succession, it is characterized by an increase in total biomass, a greater capacity to retain nutrients within the system, increasing species diversity, and increasing size and life spans of organisms. Eventually, the community will reach a point where the mixture of populations creates no new changes in the environment. At this point, the specific populations in the stable community are said to make up a **climax community**. While individuals within a climax community will come and go, the essential makeup of the populations within the climax community will stay constant.

Which species are dominant in a particular climax community is determined by unique factors of that geographical area, such as temperature, rainfall, and soil acidity. Since a climax community does not change the environment, it also does not affect its own dominance; a climax community will remain dominant unless destroyed by a significant change in climate or some catastrophic event such as a fire or volcanic eruption.

### Succession in Action

Imagine a catastrophic event: a forest fire rages through the Green Mountains of Vermont. The fires burn everything and leave behind a barren, rocky expanse.

The population of trees that once lived in this area can't grow back because the fire has changed the ground composition. Without tree roots to act as anchors, rain washes away the soil and the ground becomes rocky and barren. This rocky ground, however, proves ideal to lichens, the pioneer population. The lichens colonize the rocks and thrive. As part of their life process, lichens produce acids that break down rock into soil. Lichens need solid places to survive: they are victims of their own success. Mosses and herbs are well suited to living in the shallow soil environment created by the lichen, and they replace the lichen as the dominant population. The mosses and herbs continue to build up the soil. As the soil deepens, the conditions favor plants with longer roots, such as grasses. Eventually the land becomes suitable for shrubs and then for trees. The early dominant trees in the community will be species like poplar, which thrive in bright, sunlit conditions. As more trees grow in the area, however, there is less sunlight, and maples, which grow in shade, supplant the sun-starved poplars. The maples eventually dominate the community, because they don't change the soil composition and thrive in their own shade. The community has reached its climax community, with maple as the dominant species. Don't forget that during all this, the changing vegetation has brought with it various changes in animal populations.